

1 Display Apparatus

2

3 The present invention relates to display apparatus,
4 particularly, but not exclusively, display apparatus
5 which is used as personal jewellery or wrist
6 watches.

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8 Most people own a wristwatch and they can be found
9 in a number of guises to suit personal taste and
10 disposable income. They all have the same basic
11 features, however, of a central section which
12 provides the time and display (be it analogue or
13 digital) and also contains the watch's mechanism, a
14 strap or bracelet which surrounds the wearer's wrist
15 and a clasp or buckle to secure the whole
16 arrangement to the wearer's wrist.

17

18 The present invention is directed to a display
19 apparatus for personal wear.

20

1 The present invention provides a display apparatus
2 comprising a flexible display member and a control
3 unit provided at one end of the display member, the
4 display member being in the form of a strip of a
5 size suitable to be positioned around a limb of a
6 user.

7

8 In one form of the invention, the display member is
9 malleable, the malleable display member preferably
10 being sufficiently stiff as to retain its shape
11 without the need for a latch or other retainer.
12 This allows a given product to fit a wide range of
13 users, and makes the product easier to use.

14

15 The term "malleable" is used herein to mean capable
16 of being shaped or moulded by the application of
17 hand pressure to a shape which is retained until the
18 shape is again altered by hand pressure. One form
19 of malleable member contemplated in this invention
20 is a strip or band of thin metal or plastic and
21 which is initially axially straight and transversely
22 concave. An alternative is to use a strip or band
23 of a low yield point, such as a soft alloy.

24

25 The display member may comprise an electro-
26 luminescent display bonded to a malleable strip; and
27 in a preferred form the display member comprises a
28 rubber backing, a strip of thin steel forming said
29 malleable strip, said electro-luminescent display, a
30 filter layer, and an anti-moisture covering.

31

1 In an alternative form of the invention, the
2 apparatus can be secured by a buckle or clasp.

3

4 In either form, controls are preferably provided on
5 the display member, most suitably in the form of
6 touch-sensitive areas on the display. This
7 simplifies construction, and makes it easier to seal
8 the apparatus against water.

9

10 The control unit preferably comprises a timing
11 circuit and the display member is adapted to display
12 time indicia, whereby the apparatus functions as a
13 watch. Additionally, or alternatively, the control
14 unit may comprise means for generating visual
15 patterns on the display member, whereby the
16 apparatus functions as an electronic bracelet.

17

18 Preferably also, the display member is removably
19 attached to the control unit, whereby the display
20 member can be detached and replaced with an
21 alternative design or size to suit the individual.
22 Thus, the apparatus can readily be adapted to
23 different styles and appearances according to the
24 desires of the user and his/her social milieu at a
25 given time.

26

27 An embodiment of the present invention will now be
28 described, by way of example only, with reference to
29 the accompanying drawings in which:

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31

1 Fig. 1 is a plan view of a display apparatus
2 according to the present invention;

3
4 Fig. 2 is a perspective view of the apparatus
5 of Fig. 1 in which the apparatus has been
6 moulded into a loop;

7
8 Fig. 3 is a perspective view of the apparatus
9 of Fig.1 showing the details of the
10 construction of the apparatus;

11
12 Fig. 3a is a cross-section of part of Fig. 3 to
13 an enlarged scale; and

14
15 Fig. 4 is a schematic of an alternative circuit
16 arrangement.

17
18 Referring to the drawings and initially to Fig. 1
19 there is shown a watch according to the present
20 invention generally referred to as 10. The watch 10
21 comprises two main elements, a control unit 12 and a
22 malleable display band or sprung band 14. The
23 control unit 12 and the sprung band 14 are not
24 permanently connected and can be readily
25 interchanged.

26
27 The control unit 12 contains all of the required
28 mechanisms and the power source for the watch. It
29 consists of a rear cover 26 and a top cover 28 which
30 clip securely together and house a battery 12a and
31 electronics 12b.

32

1 In this case the watch uses a standard quartz
2 circuit and an ordinary watch battery.

3

4 The sprung band 14 is constructed from several
5 layers which are shown in greater detail in Fig. 3,
6 and which are held together by double-sided LSE
7 clear 3M adhesive between adjacent layers.

8

9 The bottom layer 16 is a 500µm thick natural rubber
10 section. Above that is a layer 18 composed of a
11 50µm plastic coated hardened and tempered steel.
12 Above that is a 100µm thick electro-luminescent
13 display layer 20 on top of which is a 50µm polyester
14 deep dyed filter layer 22. Finally, there is a
15 100µm anti-moisture ingress coating 24. All five
16 layers form a composite sandwich to make up the
17 sprung band 14.

18

19 The steel layer 18 has the transverse shape shown in
20 Fig. 3a, that is curved in a gentle arc, when the
21 sprung band 14 extends in a straight path. When the
22 apparatus is applied to the wrist and wrapped around
23 it, the transverse curve straightens out and the
24 tension in the layer 18 acts to maintain the band in
25 its wrapped condition until peeled off.

26

27 The four layers apart from the electroluminescent
28 layer 20 terminate first inside the control unit 12.
29 The electroluminescent layer 20 continues further
30 into the control unit 12 and adopts its shape. The
31 layer 20 has a beryllium-copper surface-mounted
32 connector similar to the mounting of an LCD in a

1 mobile phone. This allows the user to have several
2 displays of differing colours and layouts driven
3 from a common driver circuit and battery.

4

5 The sprung band 14 also contains touch sensitive
6 buttons (not shown). These are used to control the
7 functions of the watch such as setting the time.
8 Buttons may also be included which alter the display
9 properties of the band, for example to increase
10 luminescence or to change a decorative pattern on
11 the watch.

12

13 It will be appreciated that the display must be
14 flexible. In addition to electroluminescent
15 displays, other forms of flexible display may be
16 used such as organic light emitting diode, light
17 emitting polymer, and organic liquid crystal
18 display.

19

20 In use the watch 10 is placed over the wearer's
21 wrist in its initial flat form. The wearer then
22 applies pressure to the ends of the watch 10. The
23 sprung band 14 yields to the pressure and moulds
24 around the wearer's wrist as described above. Once
25 a desired fit is attained, the wearer discontinues
26 the application of pressure. The watch 10 is left
27 in a moulded position around the wearer's wrist.
28 The watch 10 in this form can be seen more clearly
29 in Fig. 2.

30

31 The watch 10 does not require any latch mechanism to
32 hold it in this position, as the malleability of the

1 sprung display band 14 retains it around the
2 wearer's wrist until the wearer wishes to remove it.

3

4 Since the watch 10 has a malleable property, it can
5 be readily moulded into a number of shapes or sizes.
6 Standard lengths of display bands 14 can fit a
7 variety of wearers with differing wrist sizes.
8 Alternatively a single wearer can deploy the watch
9 on another limb; the leg for example.

10

11 Since the control unit 12 and display band 14 are
12 interchangeable, the wearer can alternate shapes and
13 designs of display band to suit mood or occasion.

14

15 Figure 4 illustrates a more sophisticated control
16 arrangement. In Figure 4, a display 40 is
17 controlled by a microprocessor 42 via a display
18 driver circuit 44. For use as a watch, accurate
19 time reference is given by a reference crystal 46.
20 Control inputs to the microprocessor 42 are provided
21 by touch-sensitive inputs 48. The apparatus is
22 powered by a battery 50, which is preferably a
23 rechargeable battery (most suitably using lithium
24 ion technology) which can be recharged via power
25 inputs 52, or by an inductive arrangement. For
26 example, recharging could be by an existing cell
27 phone charger via a suitable adaptor.

28

29 Alternatively, the battery may be recharged by a
30 solar cell or by a thermoelectric cell using the
31 body heat of the wearer.

32

1 As a further alternative, a lithium ion polymer
2 battery could be used; since these are conformable,
3 the battery could be included in the wrists trap
4 rather than the control unit.

5

6 Power consumption may be reduced by providing a
7 light sensor and controlling the display
8 illumination in accordance with ambient light.

9

10 The example of Figure 4 is suited for use where the
11 display 40 is in the form of a pixel array. In this
12 case, the display can be controlled to display the
13 time together with fixed or dynamic graphics, which
14 may be pictorial or abstract, and monochrome or
15 colour. Also, since the arrangement of Figure 4 is
16 microprocessor based, it would be simple to include
17 a radio frequency link, for example using Bluetooth
18 technology, and to use the control inputs 48 for
19 remote control of other devices.

20

21 A number of modifications are envisaged without
22 departing from the scope of the invention.

23

24 The invention may be provided as an item of
25 adornment only, not containing a time displaying
26 function. The invention could therefore display an
27 attractive design for aesthetic purposes only. This
28 design could also be changeable via the control unit
29 alternating between several designs.

30

31 The invention may include means to program the
32 device to alternate the displayed design at a set

1 frequency, or to strobe or produce other interesting
2 or eye-catching effects.

3

4 All this can be separate from or in conjunction with
5 a display of the time.

6

7 The apparatus may be double sided, such that it can
8 be wrapped around the wrist in either direction.

9 One side might then display the time and the other
10 side a graphic display. Either side or both may be
11 animated.

12

13 The apparatus may include an external plastic casing
14 enclosing the whole apparatus.

15

16 Furthermore, the invention may include a sound
17 sensor linked to the display feature. Therefore if
18 the invention is exposed to a sound source, for
19 example if the wearer is in a nightclub, the
20 invention would provide an attractive display which
21 flashes or illuminates selectively in response to
22 the tempo of the music.

23

24 Although it is preferred to have the display band
25 readily detachable from the control unit, it would
26 be possible to mount the control circuitry directly
27 onto the display substrate, possibly but not
28 necessarily a rigid portion.